Microthermometry and Raman spectroscopy of fluid and melt inclusions in the alpine porphyry copper deposits from Romania: insights on micrometallogeny

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Triangular opaque daughter mineral as chalcopyrite (or nantokite, CuCl) is common in silicate-, and salt melt inclusions, but also in intermediate-density "like"-, and/or hydrosilicate vapor-"melt" inclusions in porphyry (Cu-Au-Mo) deposits from Romania. There are several generations of chalcopyrite daughter phases encompassing the porphyry copper deposits and related epithermal sequences, including skarn associations. During microthermometry, in silicate melt inclusions the opaque triangular chalcopyrite turned in spherical globulae up to 1037°C after the aqueous bubble dissapearance in the silicate melt at 925°C [1, 2]. It was noted that the opaque phases from hydrosaline melt inclusions turned in a liquid or solid transparent phase ($FeCl_2$-?) around 700°-800°C and then dissapeared at higher temperature in the silicate or hydrosaline phases. The solid phases in brine inclusions melted one by one, such as javoreieite, $KFeCl_3$ [3], halite (≥ 52-79 wt.% NaCl eq.), other transparent phases melted between 600°-700°C, anhydrite melted around 723°-1063°C and then the opaque phases around 800°C to ≥1068°C. On reversal quenching cycles bubble renucleated first around 1039°C-600°C, opaque around 900°-700°C, then other transparent microphases, chalcopyrite renucleated around 650°-500°C, halite around 500°-300°C, and another opaque microphase(s) around 200°C. It is worth noting that the microthermometry is not entirely reproductible due to internal modifications during heating, similar to hydrogenation experiments [4]. Raman spectra before microthermometry and after decrepitation were assigned to CO_3^{2-}, HCO_3^-, SO_4^{2-}, CO_2, CH_4 and various sulfides, sulphosalts, anhydrite and oxides.

[1] Pintea (2009) *ECROFI XX Abstr.Vol.*, 187-188. [2] Pintea (2014) *Rom. J. Earth Sci.* **87**, 1. [3] Koděra *et al.* (2017) Eur. J. Mineral. **29**(6), 995-1004. [4] Spencer *et al.* (2015) *Chem. Geol.* **412**, 15-25.